

rently use tampons either as the only method (11 percent) or with pads (21 percent). However, they were no different in age at first use of tampons (less than 15 years), lifetime use of tampons (86 percent), nor are they overrepresented among those who had never used tampons (36 percent). They are significantly more likely (14 percent) to not use tampons because of being unmarried than either black or white women. This confirms the hypothesis that this group would use tampons less frequently than other women.

Thus, age-related use of tampons does not explain the higher incidence of TSS in younger women, and differences in racial-ethnic use of tampons seem insufficient to explain the rarity of TSS among black women.

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**AIDS-Related Knowledge, Attitudes, and Precautionary Behaviors Among Emergency Medical Professionals**

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**Synopsis** .....

*AIDS-related knowledge, attitudes, and precautionary behaviors were assessed among a random sample*

*of Michigan-licensed emergency medical service (EMS) professionals between June and August 1988. Of 2,000 mailed questionnaires, 1,020 were returned (51 percent response), and 997 of the returned questionnaires were used in the final analysis.*

*Survey results indicated that most respondents were able to correctly identify the transmission routes of the human immunodeficiency virus (HIV), but many respondents had misconceptions about nonviable routes, the incidence of HIV infection among health care workers, and some aspects of the natural history of HIV. More than half of the respondents (56.6 percent) believed that their chances of becoming infected with HIV were "somewhat high" or "very high," although the number of documented HIV seroconversions due to occupational HIV exposures in health care settings is low. Although only six respondents (0.6 percent) reported that they had refused treatment to patients known or suspected to be infected with HIV, 25 percent felt that EMS professionals should be allowed to refuse treatment under such circumstances.*

*Potential exposures to HIV were assessed through respondents' reports of three activities in the 6 months prior to the survey. For each activity, use of universal precautions recommended by the Centers for Disease Control was also assessed. In general, few respondents reported the consistent use of precautions. While the majority of those attempting resuscitations (86.9 percent) reported that they always use a protective device, only 36.7 percent of those treating bleeding patients reported that they always wear gloves, and only 21.9*

percent of those using needles reported that they do not recap them after use.

*EMS professionals must increase their use of universal precautions. The results of this study suggest that*

*educational programs about AIDS and HIV infection may be one way to reach this goal. In addition, further research should be undertaken to identify barriers other than lack of knowledge that may deter or prevent the use of universal precautions by these professionals.*

**R**ECENT ASSESSMENTS in a large urban hospital indicated that as many as 1 in 17 emergency patients can be infected with the human immunodeficiency virus (HIV) (1, 2). In caring for these patients before they reach the hospital, emergency medical service (EMS) professionals can expect to work with an even greater proportion of infected patients in the future (3). Unrealistic fear of HIV infection may also jeopardize the quality of care provided (4). For these reasons EMS professionals need to have an appropriate perception of their risk and to take appropriate precautions consistently. At the same time, inappropriate fears among EMS personnel and other barriers to high level care must be identified and eradicated.

Although the actual risk of becoming infected with HIV in a health care setting is unknown, it is believed to be very low (5). As of July 1988, HIV seroconversion following occupational exposure had been documented for only 17 health care workers who had no other risk factors. The majority of these cases were associated with percutaneous inoculation of blood from a patient with HIV infection. In studies that have followed health care workers exposed to body fluids of patients infected with HIV, it has been shown that the risk of becoming infected with HIV is less than 1 percent in a needlestick injury and even lower for other types of exposures (for example, sharp-object cuts, contamination of mucous membranes, and open wounds or nonintact skin) (5).

To further reduce the risks of HIV infection in health care settings, the Centers for Disease Control (CDC) have recommended a set of universal precautions to be applied in all circumstances in which there is potential for contact with blood or other specified body fluids (6). The recommended precautions include the immediate disposal of needles and other sharp objects used in the course of treatment by placing these items in a puncture-resistant container. To avoid needle-stick inoculations, needles should never be recapped. Appropriate protective barriers should be used to prevent exposure to blood, body fluids containing visible blood, and other specified body fluids. These barriers include vinyl or latex gloves and masks, gowns, and protective eyewear when there is potential for fluid splashes. Although mouth-to-mouth resuscitation has not been documented as a route of HIV transmission, many other

pathogens can easily be transmitted in this manner. For this reason the use of a protective one-way valve mask is recommended when attempting to resuscitate a patient. Universal precautions are meant to be used in conjunction with existing infection control practices such as routine hand washing.

The importance of using these precautions consistently cannot be understated. Marcus and the CDC Cooperative Needlestick Surveillance Group estimated that 37 percent of the exposures represented in their study could have been avoided by the use of appropriate precautions such as the proper disposal of sharp objects and needles (5).

The extent to which universal precautions are being used routinely among health care providers is unclear, as few studies have been conducted to determine compliance with these recommendations. Link and his colleagues have reported that 74 percent of medical and pediatric interns and residents in house staff training programs affiliated with several New York City hospitals reported using gloves when drawing blood from patients with AIDS (7). Only 50 percent of these interns and residents, however, routinely used gloves for drawing blood from patients known to have risk factors for HIV infection but not suspected to have AIDS. Furthermore, Kelen and associates noted the infrequent adherence to recommendations for universal precautions in their studies of hospital emergency room procedures and patients (1, 2). In their more recent study, emergency department personnel followed recommendations for universal precautions during interventions involving 44 percent of all patients treated and only 19.5 percent of patients with profuse bleeding (1).

Studies about AIDS and HIV infection among health care workers such as physicians or nurses have shown that the majority of them are well informed about viable means of HIV transmission (8-10). However, knowledge about nonviable means of HIV transmission, some aspects of HIV natural history, and the full range of universal precautions has been found to be inconsistent (9, 10).

Misconceptions about AIDS and HIV infection may be influencing the attitudes of health care workers and adversely affecting quality of patient care. Many perceive themselves to be at so great a risk of becoming infected with HIV that they would prefer not to treat

persons with HIV infection or disease (7, 11, 12). In addition, several studies indicate that an appreciable number of health care workers are homophobic, and researchers have suggested that homophobic attitudes may also be associated with decreased quality of care (12-15).

The extent to which these findings among other health care workers concerning AIDS-related knowledge, attitudes, and precautionary behaviors are applicable to emergency medical service professionals is unknown. For this reason we wished to gain an overall understanding of these issues among a large group of EMS professionals. Two outcomes considered detrimental to quality of patient care and the safety of EMS professionals were also investigated in particular detail: (a) support for a policy of allowing EMS professionals to refuse treatment to persons known or suspected to be infected with HIV and (b) the inconsistent use of universal precautions by EMS professionals. Avoiding these outcomes would further promote satisfactory levels of care for all emergency patients and reduce the occupational risks for EMS professionals.

## Methods

A random sample of 2,000 emergency medical service professionals was drawn from a sampling frame of all Michigan-licensed EMS professionals whose names and addresses are kept on file by the Division of Emergency Medical Services within the Bureau of Health Facilities of the Michigan Department of Public Health. In May 1988 when the sample was drawn, 12,894 EMS professionals were licensed in Michigan at four levels based on the amount of training received. These four levels (from lowest to highest level of training) include Attendants, Basic Emergency Medical Technicians (Basic EMTs), EMT Specialists, and Advanced EMTs. In Michigan all EMS professionals are trained in accordance with standards set by the U.S. Department of Transportation. With the exception of Attendants, all EMTs must pass both written and practical examinations for licensure. Attendants and Basic EMTs may perform cardiopulmonary resuscitation (CPR) and advanced first aid. EMT Specialists may also perform endotracheal intubation, use the esophageal operator airway, and administer intravenous fluids for the purpose of volume replacement. Advanced EMTs may perform paramedical duties.

Drafts of the survey questionnaire were pilot-tested among licensed EMS professionals working for ambulance companies and volunteer or professional fire departments. The final survey instrument included four major sections. The first section included questions designed to assess knowledge of HIV transmission, nat-

ural history, and incidence among health care workers. The second section assessed several categories of attitudes by requesting that the respondents indicate their level of agreement with a series of statements. Topical areas included fear for personal safety, feelings towards homosexuals, and provision of medical services to persons with HIV infection. The third section of the instrument was designed to evaluate potential occupational exposures to HIV and the precautions taken to prevent HIV infection. A series of skip-questions asked participants whether or not they had treated bleeding patients, used needles when treating patients, or attempted to resuscitate a patient during the 6-month period prior to the survey. If the participant reported any of these exposures, they were asked to respond to follow-on questions regarding precautions taken or hazards encountered during that particular type of exposure. Other questions included in this section inquired about exposure to persons known or suspected to be HIV-infected and the provision of services to such patients. The final section of the survey instrument included questions designed to determine the demographic characteristics and working conditions of respondents.

The survey instrument was distributed in two separate mailings to each member of the sample during June and July 1988. The cover letter accompanying the first mailing assured sample members that their participation was completely voluntary and anonymous. The second round of the questionnaire was sent 2 weeks after the initial mailing. This time a different cover letter was included which encouraged the participation of nonresponders, while asking those who had already responded to ignore and discard the second mailing.

**Data analysis.** All descriptive and multivariate analyses of the data collected in this study were performed using standard statistical packages (16, 17). Reported significance levels for bivariate analyses were calculated using the chi-square statistic. Multiple logistic regression analyses were performed to determine significant predictors of the primary outcome variables of interest. A standard set of predictors was used in all analyses, and it included variables pertaining to respondents' knowledge, attitudes, precautionary behaviors, and socio-demographics. Reduced logistic models were constructed on the basis of chi-square statistics calculated using log-likelihood values generated by separate models that included and excluded the possible predictor variables. Final models included only those predictors with significant chi-square values ( $P < 0.05$ ). The strength of association between outcomes and predictors is described using the odds ratio (OR) accompanied by its 95 percent confidence interval (CI) calculated from the reduced logistic regression models.

**Construction of indices.** Two indices were created to summarize (a) misconceptions of the respondents about nonviable routes of HIV transmission and (b) respondents' attitudes toward those who have homosexual relationships. The reliability of the indices was evaluated through calculation of Cronbach's alpha. Both indices were scored from zero to 10 and were trichotomized for inclusion into the logistic regression models. Scores less than 3.33 were classified as "low," scores greater than the 6.67 as "high," and the residual category as "intermediate."

**Misconceptions index.** The misconceptions index was calculated by awarding an unweighted score of 2.5 for incorrect responses relating to each of four questions about nonviable means of HIV transmission. Constituent items addressed the possibility of contracting HIV through blood donation, sharing food utensils, being bitten by an insect, and skin-to-skin contact with someone who has AIDS. Cronbach's alpha for this index was moderate (0.52) but was considered sufficient for study analyses. The respondents' mean score was 2.88 (range = 0 to 10) with a standard deviation (SD) of 2.70.

**Homophobia index.** Homophobia was assessed using a 4-point Likert scale assessing agreement or disagreement with two statements concerning (a) not allowing homosexuals to be EMS professionals and (b) being upset upon learning that a coworker was homosexual. Index scores were obtained by multiplying 1.67 times the sum of unweighted scores. Cronbach's alpha for this index was 0.78, and the mean was 4.84 (range = 0 to 10, SD = 3.31).

## Results

**Survey participants.** Of the 2,000 questionnaires which were mailed, 1,020 (51 percent) were returned by August 31, 1988, the deadline set for inclusion in the survey. Of 1,020 completed questionnaires received, 23 were excluded because the participant reported working outside of Michigan. The final survey sample includes 997 respondents (49.9 percent of the total sample).

Of the 997 respondents, 9 percent reported being licensed as Attendants, 61 percent at Basic EMTs, 11 percent as EMT Specialists, and 19 percent as Advanced EMTs. Forty-eight percent reported that they engaged in EMS work on a voluntary basis, 27 percent for a public organization, 17 percent for a private organization, and the remaining 8 percent classified their EMS work as "other." This category included a small number of persons who identified themselves as work-

Table 1. Correct responses to items assessing knowledge of HIV transmission, natural history, and prevalence among 997 EMS professionals in Michigan

Statement (correct response)	Percent correct
<i>HIV transmission knowledge</i>	
HIV may be acquired from:	
Receiving blood of person with AIDS (PWA). (true) . . . . .	98.1
Sexual intercourse with PWA. (true) . . . . .	96.6
Donating blood. (false) . . . . .	88.8
Skin-to-skin contact with PWA (assuming no open sores or dermatitis). (false) . . . . .	85.3
Sharing food utensils with PWA. (false) . . . . .	58.6
An insect which has previously bitten a PWA. (false) . . . . .	50.1
<i>HIV natural history and incidence among health care workers due to occupational exposures</i>	
All persons who test positive for HIV antibodies show visible symptoms. (false) . . . . .	86.9
Many health care workers have become infected with HIV by treating PWAs. (false) . . . . .	67.4
Most people develop a positive HIV antibody test within 1 week of exposure. (false) . . . . .	59.9
HIV in general is transmitted less easily than the hepatitis B virus. (true) . . . . .	58.8

NOTE: EMS = emergency medical service; HIV = human immunodeficiency virus; PWA = person with AIDS; AIDS = acquired immunodeficiency syndrome.

Table 2. HIV-related attitudes among 997 EMS professionals in Michigan

Statement of attitudes	Percent agreeing
<i>Perceived occupational risk of HIV infection</i>	
I feel my chances of becoming infected with the AIDS virus through my work as an EMS professional are somewhat high or very high . . .	56.6
My family and friends are very worried that I may become infected with the AIDS virus through my work as an EMS professional . . . . .	48.0
<i>Homophobia</i>	
I would be upset if I found out that my coworker was homosexual . . . . .	52.6
Homosexuals should not be allowed to work as EMS professionals . . . . .	42.2
<i>Provision of emergency services to HIV-positive individuals</i>	
I should be notified by medical authorities if I have treated a patient who is later found to be infected with the AIDS virus . . . . .	96.7
There should be emergency medical transport especially designed to care for someone who is infected with the AIDS virus . . . . .	53.9
Every patient treated by an EMS professional should be tested for antibodies to the AIDS virus, even if the patient does not consent to testing . . . . .	32.0
EMS professionals should be able to refuse services to a patient who is known or suspected to be infected with the AIDS virus . . . . .	25.0

NOTE: HIV = human immunodeficiency virus; EMS = emergency medical service; AIDS = acquired immunodeficiency syndrome.

**Table 3. Significant predictors of respondents' agreement with the statement that EMS professionals should be allowed to refuse treatment to persons known or suspected to be infected with HIV**

Predictor	Odds ratio	95 percent CI
Misconceptions index about nonviable routes of HIV transmission:		
Low (referent) .....	1.00	....
Intermediate .....	1.26	0.83–1.90
High .....	1.97	1.24–3.18
Homophobia index:		
Low (referent) .....	1.00	....
Intermediate .....	2.80	1.72–4.65
High .....	3.92	2.30–6.88
HIV-antibody testing for all patients:		
Not desired (referent) .....	1.00	....
Desired .....	1.77	1.26–2.52
Special transport for HIV-infected persons:		
Not desired (referent) .....	1.00	....
Desired .....	3.32	2.34–4.86
Concern of family or friends or both that EMS professional will become infected with HIV through occupational exposures:		
Not worried (referent) .....	1.00	....
Worried .....	1.54	1.09–2.17
Treatment of HIV-positive individual:		
Treatment of HIV-positive (referent) .....	1.00	....
Did not treat HIV-positive .....	1.43	1.00–2.05

NOTE: EMS = emergency medical service; CI = confidence interval; HIV = human immunodeficiency virus.

ing in other health professions, in EMS training programs, or in both public and private settings. Twenty-eight percent of respondents reported that they performed most of their EMS activities in the four urban counties of southeast Michigan which include Detroit. Sixty-four percent of the respondents were male, and 95 percent were white. The mean age of respondents was 35.2 years (median 34.0 years), and respondents had been licensed in Michigan for an average of 6 years (median 5 years). In the 6 months prior to receiving the survey questionnaire, 37 percent reported treating more than 20 patients per month. In this same period, 34 percent indicated that they had treated or transported at least one patient known or suspected to be infected with HIV.

**AIDS-related knowledge.** Correct responses to items assessing knowledge of HIV transmission, natural history, and incidence among health care workers attributable to occupational exposures are available in table 1. Almost all respondents (> 96 percent) correctly indicated that HIV could be acquired from a blood transfusion from someone with AIDS or from unprotected sexual intercourse with a person with AIDS (PWA). While most respondents agreed that HIV was not acquired from donating blood (88.8 percent) or from

skin-to-skin contact with a PWA (85.3 percent), much lower percentages of respondents knew that HIV could not be acquired by sharing food utensils with a PWA (58.6 percent) or from an insect bite (50.1 percent). Overall, the majority of respondents had accurate knowledge about nonviable routes of HIV transmission, but 21.1 percent received an “intermediate” score on the misconception index, and 12.6 percent received a “high” score.

With respect to natural history and incidence of HIV among health care workers, almost all respondents (86.9 percent) indicated correctly that not all persons who test positive for HIV antibodies display visible symptoms. However, fewer respondents (67.4 percent) knew that few health care workers have become infected with HIV through the treatment of PWAs. Lower proportions of respondents recognized correctly that most people do not develop a positive HIV-antibody test within 1 week of exposure (59.9 percent) and that HIV generally is transmitted less easily than the hepatitis B virus (58.8 percent).

**Perceived risk of HIV infection.** The extent to which this sample of EMS professionals perceived themselves to be at risk of contracting HIV through occupational exposures is reflected in the responses summarized in table 2. Almost 6 in 10 respondents (56.6 percent) reported that their chances of becoming infected with HIV due to EMS-related exposures were either “somewhat high” or “very high.” Similarly, almost half (48.0 percent) agreed that their family or friends were very worried that they may become infected with HIV due to EMS-related exposures.

**Attitudes about homosexuals.** Just over half of the respondents agreed that they would be upset if they found out that a coworker was homosexual (table 2). In addition, 42.2 percent said that homosexuals should not be allowed to work as EMS professionals. Almost half of the respondents (48.7 percent) received an “intermediate” score on the summary index of homophobia, and 23.0 percent received “high” scores.

**Provision of services to HIV-infected persons.** As presented in table 2, the great majority of respondents (96.7 percent) felt they should be notified by medical authorities if they had treated a patient who was later found to be infected with HIV. More than half (53.9 percent) thought that there should be EMS transport especially designed to care for someone who is infected with HIV. One-third of respondents (32.0 percent) supported mandatory HIV-antibody testing for all patients treated by EMS professionals, while one-quarter (25.0 percent) indicated that EMS professionals should be

Table 4. Potential exposures to HIV and precautions taken to prevent HIV infection among 997 EMS professionals during 6 month period prior to survey

Activity (recommended precaution to prevent potential HIV transmission)	EMS professionals reporting activity		Precautionary measure taken consistently (among those reporting activity)	
	Number	Percent	Number	Percent
Treatment of bleeding patients (Always use protective gloves) .....	877	88.0	322	36.7
Attempted resuscitation (Always use a protective device) .....	628	63.0	546	86.9
Used needles when treating a patient (Never recap needle after use on a patient) .....	384	38.5	84	21.9

NOTE: HIV = human immunodeficiency virus; EMS = emergency medical service.

able to refuse services to a patient who is known or suspected to be infected with HIV. With respect to their reported actions taken toward a person known or suspected to be infected with HIV, 6 (0.6 percent) of the respondents said that they personally had refused treatment to such persons, and 51 (5.1 percent) reported that they knew another EMS professional who had refused to render services under such conditions.

Study variables that were found in the logistic regression analysis to be significant predictors of respondents' agreement with the statement that EMS professionals should be allowed to refuse treatment to persons known or suspected to be infected with HIV may be found in table 3. The best model indicated that respondents who had "high" scores on the indices summarizing misconceptions about routes of HIV transmission and homophobia were more likely than those having low scores to agree that EMS professionals should be allowed to refuse treatment to patients. Respondents agreeing with this statement were also more likely to agree with other statements reflecting the desire for a preferred or more protected work environment such as requiring mandatory HIV-antibody testing for all patients treated (OR = 1.77) and having emergency medical transport especially designed for treating persons infected with HIV (OR = 3.32). Although perceived risk was not a significant predictor of advocating the right to refuse treatment (OR = 0.96, CI = 0.66-1.39), respondents who felt that their family and friends were worried that they would become infected with HIV through occupational exposures or who had not treated persons infected with HIV in the 6 months prior to the survey were more likely than the referent group to support this view.

**Occupational exposures and precautions.** The proportions of respondents who reported professional activities that could lead to HIV transmission in the 6 months before the survey are presented in table 4 and are accompanied by reports of the use of precautionary measures among those who engaged in these activities. The most commonly experienced potential exposure

(indicated by 88.0 percent of respondents) was the treatment of at least one bleeding patient in this period. The majority (69.2 percent) of EMS professionals who had treated bleeding patients acknowledged unprotected contact with patients' blood. However, among this same group of EMS professionals who had treated bleeding patients, approximately one in three (36.7 percent) indicated the consistent use of protective gloves. Logistic regression analysis indicated that inconsistent use of protective gloves when treating bleeding patients was strongly associated with having unprotected contact with patients' blood (OR = 18.33, CI = 13.10-28.04).

The second most commonly reported potential exposure was at least one resuscitation attempt during this period. Almost two-thirds (63.0 percent) of respondents indicated that they had attempted a resuscitation, and 86.9 percent indicated that they always used a protective device.

The use of needles to treat a patient was reported by 38.5 percent of respondents and, of these EMS professionals, one in five (21.9 percent) reported following the CDC-recommended safe procedure of not recapping needles. About 1 in 10 (12.2 percent) also acknowledged sticking themselves with a needle that had been used on a patient. However, logistic regression analysis, using the subsample of those who had incurred needlestick injuries, indicated that recapping needles was only marginally associated with needlesticks (OR = 2.32, CI = 0.82-6.49).

An analysis of respondents' reporting any or all of the three exposures revealed that only 24.1 percent of those who treated bleeding patients, used needles in the course of treating patients, or attempted a resuscitation during the 6-month period prior to the survey, reported the consistent use of precautionary measures.

**Predictors of taking precautions.** Significant predictors of taking inadequate blood, needle, and resuscitation precautions are summarized in table 5. Each precaution was examined using a series of multiple logistic regression models beginning with the full set of potential predictor variables. Level of licensure was

**Table 5. Significant predictors of taking inadequate blood, needle, and resuscitation precautions in the 6 months prior to the survey**

Predictor	Odds ratio	95 percent CI
<i>Inadequate blood precautions (not always wearing protective gloves when treating bleeding patients)</i>		
Level of licensure:		
Attendant (referent)	1.00	....
Basic EMT	1.52	0.90–2.57
EMT Specialist	2.10	1.08–4.09
Advanced EMT	2.64	1.41–5.02
Type of work:		
Volunteer (referent)	1.00	....
EMS for private organization	0.85	0.53–1.33
EMS for public organization	0.66	0.44–0.95
Other	0.51	0.26–0.92
Treatment of HIV-positive individual:		
Treated HIV-positive (referent)	1.00	....
Did not treat HIV-positive	1.42	1.02–1.97
<i>Inadequate needle precautions (recapping a needle which has been used to treat a patient)</i>		
Type of EMS work:		
Volunteer (referent)	1.00	....
EMS for private organization	1.40	0.75–2.57
EMS for public organization	2.65	1.34–5.31
Other	2.73	1.14–6.57
Perceived risk of HIV infection:		
Low (referent)	1.00	....
Somewhat, very high	1.89	1.15–3.12
<i>Inadequate resuscitation precautions (attempting a resuscitation without using a protective device)</i>		
Level of licensure:		
Attendant (referent)	1.00	....
Basic EMT	0.79	0.29–2.05
EMT Specialist	0.66	0.21–1.98
Advanced EMT	0.22	0.06–0.70
Location where most EMS duties performed:		
Southeast Michigan (referent)	1.00	....
Other Michigan	2.53	1.33–4.86
Mandatory HIV-antibody testing of all patients:		
Agree (referent)	1.00	....
Disagree	2.27	1.23–4.22

NOTE: CI = confidence interval; EMS = emergency medical service; HIV = human immunodeficiency virus.

found to be an important predictor of respondents taking both inadequate blood and resuscitation precautions. EMS professionals licensed at higher levels were less likely than those at lower levels to use protective gloves when treating bleeding patients. This trend was reversed, however, with respect to using a protective device when attempting a resuscitation.

Another reversal of trends was observed with respect to inadequate blood and needle precautions. In this case volunteers were more likely than those working for public or private EMS organizations to report not always using protective gloves when treating bleeding patients. On the other hand, respondents working for

public organizations were more likely than volunteers to recap needles after use. In a separate logistic model it was observed that respondents who did not always wear gloves when treating bleeding patients were also more likely than those who always wore gloves not to use a protective device when attempting a resuscitation (OR = 2.26, CI = 1.27–4.04).

## Discussion

Several limitations may apply when generalizing these results to the entire population of EMS professionals licensed in Michigan. When respondents were compared by training level to the known distribution of all EMS professionals, statistically significant overrepresentation was observed for respondents at the higher levels of training (chi-square = 20.07, *df* = 3, *P* < 0.005). Response bias may also affect the generalizability of the survey results, as it was not possible to investigate the extent or direction of such bias. Although the level of training was assessed and controlled for, another potentially important confounder, educational level, was not (18, 19). In addition, other uncontrolled biases may be present because of the limitations of using a self-reported questionnaire.

The results of this survey suggest that most EMS professionals licensed in Michigan are able to correctly identify the major routes of HIV transmission. However, a considerable proportion hold misconceptions about nonviable means of HIV transmission, such as the belief that sharing food utensils with someone who has AIDS or that an insect bite might result in HIV infection. Understanding of the natural history of HIV and its incidence among health care workers due to occupational exposures is also incomplete in this group of providers.

Fear or perceived high risk of HIV infection through occupational exposures was a serious concern for more than half of the respondents of this survey. EMS professionals already work in a highly stressful environment, and excessive fear of HIV infection might lead to inadequate provision of emergency medical services, such as that reported by six respondents who indicated that they had refused treatment to a person known or suspected to be infected with HIV during the 6-month period prior to the survey.

The relationship between support for the right to refuse treatment and actual behavior remains unclear. Among EMS professionals participating in this survey, actual refusal to treat a patient was extremely uncommon. Only six respondents (0.6 percent) reported doing so. This behavior was, however, more common among those who supported the right to refuse treatment (1.2 percent) than among those not advocating this right (0.4

percent). While this difference is not statistically significant (chi-square = 0.85,  $df = 1$ ,  $P < 0.36$ ), this may be attributable to the small number of respondents who had refused to treat patients and warrants further investigation. In any case, increases in the prevalence of HIV infection may exacerbate this situation in the future. Support for the right to refuse treatment may also be associated with fear of infection, as reflected in the fact that respondents who supported the right to refuse treatment report that their family and friends were very worried that they may become infected with HIV through occupational exposures. Support for refusal to treat was also positively associated with homophobic attitudes and misconceptions about routes of HIV transmission.

Nearly all the EMS professionals surveyed reported exposures that have potential for HIV transmission. The treatment of bleeding patients was the most commonly reported of these exposures. An alarmingly small number, however, reported the consistent use of precautions when treating bleeding patients or when using needles. The consistent use of precautions was reported for the most part only when a resuscitation attempt was made. These results seemingly contradict the fears expressed by the respondents.

There are a number of possible explanations for the low rates of precautionary behaviors reported in the survey and elsewhere that cannot be directly addressed, given the current data set. For example, equipment needed to implement appropriate precautions may not be universally available to providers in their vehicles, or it may be available but inadequate. Kelen and associates also reported that many providers felt that the use of protective equipment hindered their performance during interventions (1). Future surveys should further assess barriers to the implementation of these precautions.

Some variables significantly associated with precautionary behaviors may also reflect heightened awareness of HIV-related issues among EMS professionals. Respondents who reported treating persons known or suspected of being infected with HIV were more likely than those who had not treated infected patients to report consistent use of protective gloves when treating bleeding patients. In addition, EMS professionals who reported recapping needles were more likely than those who followed the CDC recommendations to report high levels of perceived risk.

In summary, the results of this survey indicate an urgent need for expanded or revised educational programs directed to EMS professionals on AIDS-related issues and the use of universal precautions. Many EMS professionals have misconceptions about the routes of HIV transmission, its natural history, and its incidence among health care workers attributable to occupational

*'Fear or perceived high risk of HIV infection through occupational exposures was a serious concern for more than half of the respondents in this survey. EMS professionals already work in a highly stressful environment, and excessive fear of HIV infection might lead to inadequate provisions of emergency medical services, such as that reported by six respondents who indicated that they had refused treatment to a person known or suspected to be infected with HIV ...'*

exposures. These misconceptions, possibly compounded by homophobic attitudes, may also be leading some EMS professionals to support a policy permitting them to refuse treatment to patients known or suspected of being infected with HIV. Furthermore, most EMS professionals report they do not consistently take appropriate precautions to prevent infection with HIV, although many feel that their risk of becoming infected due to their EMS activities is high. Steps must be taken to increase the consistent use of universal precautions to reduce further the risk of HIV transmission in emergency settings and to ensure adequate care for all patients served.

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## Drug Users' AIDS-Related Knowledge, Attitudes, and Behaviors Before and After AIDS Education Sessions

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### Synopsis .....

*The investigators interviewed 100 drug users in a detoxification facility before and after they received information about acquired immunodeficiency syn-*

*drome (AIDS) and human immunodeficiency virus (HIV). The drug users already had a considerable amount of information about AIDS and HIV transmission modes before they received the information. However, 79 percent of them reported never having used condoms. Fifty percent of intravenous drug users acknowledged having shared needles during the previous year.*

*Subjects exhibited psychological denial in appraising the riskiness of their personal sexual and needle-sharing behaviors, which they rated as less risky than those activities in general. Following their participation in an AIDS and HIV education program, their knowledge concerning modes of transmission and disease progression increased. Subjects became more aware of their personal risk for HIV infection, and their faith in condom effectiveness and their intent to use them increased. Intravenous drug users reported increased determination to stop their drug use. The results suggest that AIDS education efforts can be useful in programs to help prevent HIV transmission among drug users.*

**I**NTRAVENOUS DRUG USERS are the second largest group with acquired immunodeficiency syndrome (AIDS) in the United States. Of all adult AIDS cases, 25 percent have intravenous drug (IV) use as a risk factor (1). New York City has the greatest concentration in the country of IV drug users who are HIV seropositive; their rate of infection is 50 to 60 percent (2-4).

While AIDS education programs have been shown to

induce pronounced changes in the health-related behaviors of gay and bisexual men (5), the same level of change has not been observed among IV drug users, although many drug users appear to be aware of the major methods of transmission (6-8). IV drug users report such erroneous beliefs as thinking that one can identify an HIV-infected person by sight, that AIDS can be transmitted through casual contact and by mos-